Chapter 4

MONITORING, EVALUATION, AND RESEARCH

This chapter describes how monitoring and evaluation requirements will be met. This Chapter was updated in compliance with the 2012 Planning Rule which was prepared by the Agency to outline an adaptive management framework for planning on National Forests to fulfill the requirements of the National Forest Management Act of 1976. The 2012 Planning Rule was codified in 36 CFR 219.12.

The chapter also briefly discusses future research needs on the Forest.

Monitoring

Monitoring is carried out to observe or record the results of management actions that are taken when implementing the Forest Plan. Monitoring information should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources in the plan area is needed.

Monitoring consists of collecting information from selected sources, usually on a sample basis. There are three levels of monitoring:

- Monitoring Implementation - Was it done right?
  This determines if prescriptions, projects, and activities are implemented as designed and in compliance with Forest Plan goals and guidance.
- Monitoring Effectiveness - Did it work?
  This determines if prescriptions, projects, and activities are effective in meeting management goals and direction.
- Validation Monitoring - Is the guidance appropriate?
  This determines if the initial data and assumptions used in developing the Plan were correct or if there is a better way to meet forest planning regulations, policies, and goals.

The monitoring requirements are designed to meet the requirements found in Forest Service Handbook 1909.12, Chapter 30. At Section 32.1 are eight topic areas that must be addressed by monitoring question and indicators. The eight items to be addressed in Plan level monitoring include:

i. The status of select watershed conditions.
ii. The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
iii. The status of focal species to assess the ecological conditions required under §219.9.
iv. The status of a select set of the ecological conditions required under §219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.

v. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
vi. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
vii. Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
viii. The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land.

Table 4.1 presents the monitoring questions and indicators that will be used to monitor the Forest Plan.

As the Forest Plan is implemented, more specific monitoring direction will be included in the program of work. Project plans often include site specific monitoring that will meet objectives and goals outlined in the Forest Plan. This program will be responsive, dynamic, and updated as management or direction changes.

The monitoring program will be conducted to include a consideration of the effects of national forest management on land, resources, and communities adjacent to or near the Forest, and the effect upon national forest management from activities on nearby lands managed by other government agencies or under the jurisdiction of local governments.

Evaluation

A biennial evaluation and summary of monitoring results will be written and published in a public report. The report will present a concise display of the results of monitoring. The report must indicate whether or not a change to the plan, management activities, the monitoring program, or a new assessment may be warranted based on the new information. The report is not a decision document.

The purpose of the evaluation is to make the monitoring program information available to the public and to transform the monitoring data into information that supports adaptive management so the Responsible Official may consider making adjustments to the Forest Plan, management activities, or the monitoring program, or to begin a new assessment.

Two monitoring approaches are used for monitoring the plan area to determine whether the Forest Plan needs to be adjusted. Plan monitoring identifies monitoring questions and associated indicators to measure the effects of implementing the Forest Plan. Broader-scale monitoring information, done at a regional level, is used to address relevant monitoring questions that are best answered at a larger geographic scale.

Monitoring and Evaluation Program

Monitoring questions and indicators by Forest Plan goals are identified in table 4.1. Specific monitoring items, measuring frequency, methodologies, precision, and reliability are identified in the Hoosier National Forest Monitoring and Evaluation Plan.

Table 4.1 MONITORING AND EVALUATION PROGRAM

Selected Plan Components	Monitoring Questions	Indicators
CONSERVATION OF THREATENED AND ENDANGERED SPECIES HABITAT		
Maintain, protect or improve the habitat for threatened and endangered species.	Are standards and guidelines for T&E species conservation implemented and effective?	Forest Plan standards and guideline implementation and effectiveness Population Trends Effectiveness of project implementation Habitat changes
	Are hibernacula conditions changing?	Hibernacula temperature and humidity
MAINTAIN AND RESTORE SUSTAINABLE ECOSYSTEMS		
Provide the diversity of habitats needed for viable populations of all native and desired non-native species.	Are Forest Plan goals for vegetation composition and age class being met?	Acres of various forest types by age Populations of species associated with the various habitats
	Are populations of species dependent on early successional habitat stable or increasing?	
	Are populations of species dependent on late seral habitats stable or increasing?	
Use prescribed fire to restore ecological processes	Are objectives being met through the use of prescribed fire?	Species composition change
Prevent establishment and spread of non-native invasive species (NNIS)	Are NNIS affecting the sustainability of desired ecosystems?	Changes in Forest composition
Sustainability of desired ecosystems	Is the trend of undesirable occurrence of fire, insects, disease and other mortality increasing?	Plant species mortality, insect and disease outbreaks Forest type or component shift
	Are climate stressors (drought, flooding and storm frequency and/or severity) affecting sustainability?	
	Are forest management systems substantially and permanently affecting the productivity of the land?	Forest regeneration Forest soil properties Site Index trend
	Are sulfate and nitrate deposition affecting forest health?	Forest soil and/or water acidification
	Is ecosystem health maintained or improved?	Wood Frog population trends

Selected Plan Components	Monitoring Questions	Indicators
MAINTAIN AND RESTORE WATERSHED HEALTH		
Maintenance or restoration of watershed health and function.	Are priority watersheds functioning properly?	Best Management Practices (BMP's) implementation and effectiveness Aquatic organism passage
	Are standards and guidelines implemented and effective?	Aquatic organism diversity Stream water quality Effectiveness of project implementation
	Are roads degrading watershed health and function?	Miles of high risk roads in Transportation Analysis Process
PROTECT OUR CULTURAL HERITAGE		
Protect our cultural heritage.	Are cultural resource sites being identified, evaluated, protected and interpreted?	Heritage program managed to standard Presence of a curation agreement Acres surveyed and sites evaluated Direct protection efforts Number of interpretive products
	Are project design criteria and mitigation measures being followed during implementation?	Number of sites disturbed
	Are cultural resource sites being damaged?	Number of site disturbed Number of Archeological Resource Protection Act violations
PROVIDE FOR A VISUALLY PLEASING LANSCAPE		
Emphasize natural appearing landscapes with attention given to views from roads, trails and high use areas.	Are the existing scenic resources meeting or trending toward desired conditions?	Acres of Retention, Partial Retention, Modification and Preservation met or exceeded in areas of high use and visitation

Selected Plan Component	Monitoring Question	Indicator
PROVIDE FOR RECREATION IN HARMONY WITH NATURAL COMMUNITIES		
Provide a trail system for diverse users that provides for both user safety and resource protection	Is trail user satisfaction trending up?	Trails maintained to standard
	Are forest trails meeting health, safety, accessibility, and maintenance requirements and achieving resource and social objectives?	Number of illegal motorized routes closed and rehabilitated Trail counts and use trends
Create and maintain a variety of dispersed and developed recreational opportunities	What is the status and trend of visitor use and visitor satisfaction?	Sites maintained to standard per required standards.
	Are Forest recreation sites and facilities meeting health, safety, accessibility, and maintenance requirements and achieving resource and social objectives?	Customer comments received
Protect and enhance wilderness values	Is wilderness moving toward desired future condition?	Wilderness managed to standard Wilderness Stewardship Performance elements being met Trail counts and use trends Trends in mechanized/motorized incursions; both illegal and approved
PROVIDE A USABLE LANDBASE		
The forest will strive to provide public access and consolidate NFS lands	Does public have adequate access to NFS lands?	Acres of forest with no public access easement
	Are land adjustment activities reducing fragmentation?	Ratio of miles of boundary line : total forest acres

Selected Plan Component	Monitoring Question	Indicator
PROVIDE FOR HUMAN AND COMMUNITY DEVELOPMENT		
Reduce wildfire risk to communities	Are management activities reducing the wildfire risk to communities?	Number of wildfires versus number of multi-burning period wildfires
Provide a balance of forest products	Are forest product offerings meeting Forest Plan goals?	Cubic feet of timber sold Number and diversity of forest product permits issued
Provide interpretive services to enhance visitor experience	Is our conservation and interpretive program reaching a broad audience?	Individuals reached

Steps in monitoring and evaluation and procedures to update the Forest Plan

Monitoring

- Forest staff assistance trips
- Management reviews
- Routine observations
- Site-specific observations by specialists
- Accomplishment reports
- Discussion with other agencies and public users

Evaluation

- Annual evaluation of monitoring results by interdisciplinary team and Forest staff
- Forest staff review evaluation on an annual basis
- General management review based on identified problems, generally on a 5-year basis
- Regional management reviews as needed
- Overall evaluation of annual reports by Forest Supervisor

Recommendations

- Monitoring and Evaluation Team conducts annual review and evaluation with recommendation to Forest Supervisor
- Regional management reviews recommendation to Regional Forester
- Forest Supervisor makes recommendation for Plan revision or as needed for a significant amendment

Decision

- Forest Supervisor's decision on nonsignificant amendments to Plan, documented in evaluation report
- Forest Supervisor's decisions on a need to recommend significant amendment or revision
- Regional Forester’s decision on the need for significant amendment or revision

Research Needs

Research and monitoring are related activities that allow for adaptive management of national forests. Research activities include planning, design, quality control, and peer review of studies, and relatively rigid publication standards. Monitoring, in contrast with research, is generally conducted under less controlled conditions and results are often more general. Research needs for management of the National Forests are identified during the planning process and reviewed periodically during monitoring and evaluation of the implemented Forest Plan.

Research is often done on an ad hoc basis as opportunities arise with other agencies or universities. Some needs, included here, have been identified during forest planning; other needs which surface as a result of monitoring will be reported in the annual Monitoring and Evaluation Reports.

Conservation Of Threatened And Endangered Species Habitat

Research is needed to determine the distribution, abundance, genetics, ecology, and needs of endangered and threatened species.

Maintain And Restore Sustainable Ecosystems

Native plant communities need to be better defined in terms of floral composition, distribution, genetics, abundance, site relationships (soil, slope, and aspect), indicator plants, and ecological requirements. The ecological classification system needs further development and analysis to increase understanding of natural communities, particularly site relationships affecting population distribution and abundance.

Research is needed to determine the current and historic distribution and relative abundance of animal species and communities and their ecological relationships with plant communities.

Research is needed to determine the effects of management for early successional forest habitat on biological diversity. Better understanding of the needs of young forest plant and animal species and communities, including Neotropical migrant birds, is a specific research need.

Effects need to be determined on biological diversity of management for extensive, closed-canopied forest; of forested corridors which link forest areas across the landscape; of old growth forests; and of restoration of natural plant communities. Better understanding of the needs of forest interior plant and animal species and communities, including Neotropical migrant birds, is a specific research need.

Research could focus on defining conditions that cause oak to regenerate well within those ecosystems (ECS units) where oak is a natural member of that plant community or successional or seral stage. Research needs to identify methods to ensure desired amounts of oak regeneration and the role of natural species selection in determining the final stand composition.

Better information needs to be developed on what plant species can coexist in a stable community and what appropriate control objectives and activities should be undertaken when these communities become out of balance or are invaded by exotic species. Research is needed to determine what native plants are best suited to what activities and how they can best be established.

More information on vegetation response to prescribed fire is needed to help managers make better decisions for timing and uses of prescribed fire in central hardwoods management. Determine the effects of prescribed fire and various silvicutural treatments on animal and plant species in the area, including beneficial effects to native plants and potential adverse effects to nonnative plants, animals, and karst systems.

Maintain And Restore Watershed Health

Research is needed on the effect of different types of stream crossing structures on aquatic species and stream channel hydrology.

Research is needed on presettlement stream geomorphology and hydrological function.

Protect Our Heritage Resources

Conduct non-project driven surveys to locate heritage resources on the Forest. Work toward completing surveys for all NFS lands.

Continue research of rock shelters including those at the end of their developmental cycle, i.e. those that are collapsed or have completely filled in. Because these may contain the oldest deposits, research will contribute to our understanding of the earliest humans.

Develop heritage contexts as an aid in evaluating the significance of heritage resources. Focus research on each context and identify prominent examples for intensive excavation. Interpret a range of these sites.

Emphasize oral history interviews of local elderly people to record unwritten history.

Research and compile a Forest history to document our contribution to the region and celebrate our organizational past.

Provide For A Visually Pleasing Landscape

Research is needed on the role of the visual management system and its effectiveness in national forest management.

Provide For Recreation In Harmony With Natural Communities

The Forest, working in partnership with interested groups, has the opportunity to develop many options for recreational users. More specific information is needed on current use and demand for recreation facilities now present on the Forest, along with an analysis of developing trends, and emphasis on areas needing future development.

The Forest also needs information on how to best market or de-market recreational opportunities available on the Forest to provide services to a higher percentage of the public.

Provide A Useable Landbase

No research needs identified at this time.

Provide For Human And Community Development

Effects of predicted long-term climate change on biological diversity in the Forest need to be monitored.

Management techniques need to be refined for acceptable hardwood regeneration, harvest schedules, and yield predictions for both even- and uneven-aged management.